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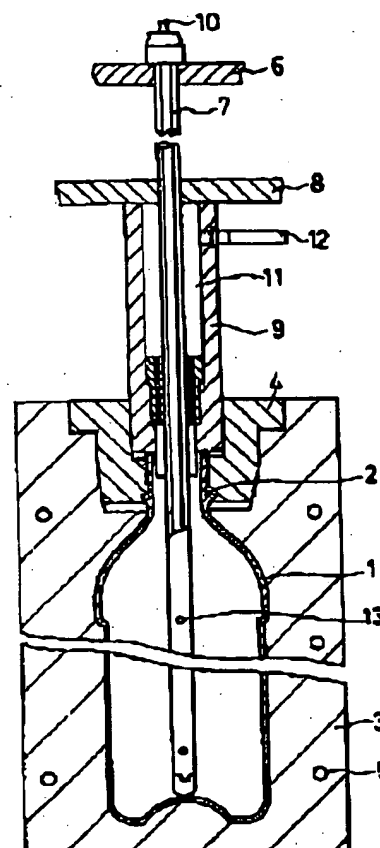
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TITLE : METHOD FOR MOLDING RESIN  
HOLLOW CONTAINER



**ABSTRACT :** PURPOSE: To obtain a molding method for preventing occurrence of residual stress and obviating the need for second dehydration of a hollow container by a method wherein just before the mold opening after the retraction of a drawing rod, the container is cooled by jetting a cooling gas out of cooling gas jet ports connecting to a cooling gas feed tube.

**CONSTITUTION:** In a method for blow molding a resin hollow container 1, a previously molded parison is put in a heated mold 3, a drawing rod 7 is brought into contact with the bottom of the parison, the parison is vertically drawn by moving the drawing rod 7 downward, a mandrel 9 for blow molding is inserted into a neck part of the parison, the parison is laterally drawn by jetting a compressed fluid through a pressurized fluid path 11 provided in the mandrel 9, and the parison is cooled and released from the mold. Just before the mold 3 opens after the drawing rod 7 is retracted, the container 1 is cooled by jetting a 10-50°C cooling gas out of a plurality of cooling gas jet ports 13 connecting to a cooling gas feed tube 10 provided in the hollow drawing rod 7.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Industrial Application]** This invention removes distortion which comes from the residual stress of the container made of saturated polyester resin obtained by biaxial stretching blow molding, and relates to the shaping approach of the hollow container made of resin which raises thermal resistance.

**[0002]**

**[Description of the Prior Art]** As the shaping approach of the hollow container which carried out biaxial stretching from the former Holding to the temperature which can extend the closed-end parison fabricated beforehand, insert in the metal mold for blow molding, and an extension rod is extended to a lengthwise direction by making it move, where said parison pars basilaris ossis occipitalis is contacted. And the shaping approach of a biaxial-stretching blow container of making the fluid compressed from the mandrel for blow molding interpolated in a top neck part blowing off, and making said parison extending in the direction of an axis of abscissa is learned.

**[0003]** Thus, the obtained container is usually used as heat sterilization bevel uses, such as a carbonated drink and a fruits drink, and tea. And since it fills up with the condition of having made potable water heating when using as a container for heat sterilization, the thermal resistance which a heat shrink or deformation of a container do not produce is required. It is known that predetermined will carry out time amount maintenance of the container generally fabricated at the elevated temperature more than the glass transition point of resin, and the approach of giving thermal resistance will open wide and carry out heat setting of the residual stress in a container.

**[0004]** \*\* heating specifically and after carrying out extension blow molding within the blow metal mold carried out How to take out, after cooling a hollow container by die cooling, in order to prevent heat deformation of a container (JP,54-66968,A), \*\* Remove residual stress in the condition [ having held internal pressure inside a hollow container within blow molding metal mold ]. How to move a hollow container in another cooling metal mold after that, apply internal pressure to a hollow container again, stick in metal mold, and carry out cooling solidification (JP,62-33622,A), \*\* There is the approach (JP,59-93330,A) of carrying out heat setting by holding a hollow container in the heated blow metal mold, making carry out diffusion injection of the liquefaction object of nitrogen or a carbon dioxide inside a hollow container after that, and cooling.

**[0005]**

**[The technical problem which is going to solve invention]** However, since the approach of \*\* heats metal mold to an elevated temperature or cools a container at low temperature with the same metal mold shaping, heat setting, and in order to cool, it has the trouble that the cycle time of a hollow container becomes extremely long, and shaping effectiveness falls. Moreover, although the approach of \*\* has the metal mold which cools shaping, the metal mold which carries out heat setting, and a container for a container, since cooling of a container is performed by the heat transmitted from metal mold, the cycle time of a hollow container becomes long at the \*\* said appearance, and it is holding the trouble that shaping effectiveness falls.

**[0006]** Furthermore, \*\* is excellent in cooling effectiveness by the approach of introducing nitrogen and the carbon dioxide which were liquefied in a hollow container, and cooling directly. However, if a container is not cooled to homogeneity in the condition that there is no difference with a time liquid object into a hollow container for very low temperature, these liquefaction objects generate the new residual stress by the difference of a cooling rate, and reduce thermal resistance, and since a liquefaction object is moreover very low temperature, the trouble of freezing the moisture in the air which piles up in a container, and removing moisture again will produce them.

**[0007]** This invention is what solves this fault. This invention In cooling the hollow container by which heat setting was carried out, closed-end parison within the same metal mold from which blow molding and residual stress are removed Since a 10--50 degree C gas is made to blow off in a hollow container and the whole

container is cooled from the hollow container inside to homogeneity. Generating of the residual stress newly produced from a difference of a cooling rate could be prevented, and since the moisture in the air which moreover piles up in a container with a gas was not frozen rapidly, the shaping approach without the need of removing the moisture in a hollow container again is developed, and it came to complete this invention.

[0008]

[Means for Solving the Problem] Namely, this invention is put in in the metal mold which heated the parison fabricated beforehand. Contact an extension rod at the pars basilaris ossis occipitalis of said parison, advance an extension rod, and it extends in the direction of an axis of ordinate. And make the fluid compressed from the pressure flow object path which interpolated the mandrel for blow molding in the top neck part of said parison, and was established in this mandrel blow off, and it is made to extend in the direction of an axis of abscissa. In the approach of carrying out blow molding of the hollow container made of resin by cooling after that and releasing from mold. Just before an extension rod retreats at least and metal mold opens, it is the shaping approach of the hollow container made of resin characterized by making the 10--50 degree C gas for cooling blow off from two or more cooling gas jet holes linked to cooling gas feeding tubing formed [ by ] in the hollow of an extension rod, and cooling a container.

[0009]

[Function and Example(s)] A drawing explains this invention to a detail below. Drawing 1 is the side-face sectional view of the blow molding equipment showing the blow molding part which a cooling medium is made to blow off inside a hollow container, and cools the hollow container of this invention inside shaping and after carrying out heat setting.

[0010] After it heats the closed-end parison by which blow molding is carried out where the mandrel 14 for blow molding is inserted in parison opening used as the container top neck part 2, and it moves to metal mold 3 and blockades metal mold 3, with the extension rod 7 in contact with the pars basilaris ossis occipitalis of parison, it is extended to a lengthwise direction and stuck to the cavity of metal mold 3.

[0011] On the other hand, with the high-pressure air sent in from blow high-pressure gas feeding and an exhaust pipe 12 through the pressure flow object path 11 of the mandrel 9 for blow molding inserted in parison opening used as the container top neck part 2, closed-end parison is extended in the direction of an axis of abscissa, is stuck to the cavity of metal mold 3, and serves as the hollow container 1. And the hollow container 1 makes high-pressure air discharge through the pressure gas path 11 of the mandrel 9 for blow molding, and blow high-pressure gas feeding and an exhaust pipe 12, after heating in the condition of having stuck to same metal mold 3 cavity and performing heat setting.

[0012] Next, in order to cool within metal mold 3, the hollow container 1 of this invention makes a cooling gas blow off from the cooling gas jet hole 13 linked to the cooling gas feeding tubing 10 for the centrum prepared in the extension rod 7, and cools the hollow container 1. And a cooling gas is discharged from BURO high-pressure gas feeding and an exhaust pipe 12 through the pressure flow object path 11 established in the blow core body 9.

[0013] Although the cooling gas jet hole 13 changes also with content volume of a container, it is desirable to prepare in spacing of extent at which the gas which blew off crosses mutually, for example, it is desirable to prepare about 4-8 places in the shaft orientations of the extension rod 7 at 2-7 places and a circumferential direction. And this cooling gas jet hole 13 is arranged so that a cooling gas may contact homogeneity at the drum section which stands in a row at the pars basilaris ossis occipitalis from the shoulder of the container which residual stress tends to generate at the time of extension.

[0014] as a cooling gas -- the ordinary temperature of air, nitrogen, a carbon dioxide, etc. -- a gaseous thing -- desirable -- temperature -- 10- the -50 degrees C of the range of 10--40 degree C of extent which does not freeze the moisture in the air in a container preferably are the optimal.

[0015] Although the jet capacity of a cooling gas changes with the thickness of a container, and temperature of a cooling gas, it is 10 - 30 l/sec preferably three to 40 l/sec per 1l. of content volume.

[0016] The main thermoplastics polyester resin of the resin used for the container of this invention whose unit is ethylene terephthalate repeatedly is desirable, and it uses the homopolymer of polyethylene terephthalate as a main component with this thermoplastic polyester resin.

[0017] Thermoplastic polyester resin a part of terephthalic-acid component and for example Isophthalic acid, naphthalene dicarboxylic acid, diphenyl dicarboxylic acid, Difenoxycarboxylic acid diphenyl ether dicarboxylic acid, Aromatic series dicarboxylic acid, such as diphenylsulfone dicarboxylic acid; A hexahydro terephthalic acid, Alicycle group dicarboxylic acid, such as hexahydro isophthalic acid; An adipic acid, sebacic acid, Aliphatic series dicarboxylic acid, such as an azelaic acid ;P What permuted and copolymerized one or more sorts of other bifunctional carboxylic acids, such as oxy acid, such as a -beta-hydroxy ethoxy benzoic acid and an epsilon-oxy-caproic acid, can be used.

[0018] Moreover, the copolymer which permuted and copolymerized a part of ethylene glycol component by one or more sorts of other glycols, such as trimethylene-glycol, tetramethylene glycol, hexamethylene glycol, deca

methylene glycol, neopentylene glycol, diethylene-glycol, 1, and 1-cyclohexane dimethylol, 1, 4-cyclohexane dimethylol, 2, and 2 (4'-beta-hydroxy ethoxy phenyl) sulfonic acids, and the multifunctional compound of these functional derivatives is sufficient as thermoplastic polyester resin.

[0019] moreover, the thermoplastic polyester resin used for the container of this invention -- intrinsic viscosity -- 0.70 to 0.90 -- it is 0.75-0.80 preferably.

[0020] Furthermore, additives, such as a coloring agent, a heat deterioration inhibitor, an antioxidant, an ultraviolet ray absorbent, an antistatic agent, an antimicrobial agent, and lubricant, can be suitably used for the container of this invention.

[0021] Example intrinsic viscosity carried out injection molding of the polyethylene terephthalate (Japanese uni-pet company make, trade name RT543H) of 0.78, and fabricated closed-end parison. Next, after carrying out the preheating of this parison to 100 degrees C, while inserting into the metal mold heated at 140 degrees C in the cartridge heater of 600W and extending in the direction of an axis of ordinate with the extension rod, it blew high-pressure air through the mandrel for blow molding, and obtained the blow molding container which extended and carried out biaxial stretching also to the longitudinal direction. Next, the container spouted -20-degree C high-pressure air for 3 seconds from the cooling gas jet hole connected to feeding tubing for cooling gases formed in the extension rod after holding for 5 seconds and carrying out heat setting within the same metal mold, and from the mandrel for blow molding, the pressure flow object path, and blow high-pressure gas feeding and an exhaust pipe, high-pressure air discharged the cooling gas and cooled the hollow container. Thus, the property of the obtained hollow container is as follows.

Capacity: It was a capacity almost equivalent to the non-heatproof container which there is almost no heat shrink at the time of shaping, and was fabricated with the metal mold of ordinary temperature.

Thermal resistance: The capacity reduction after filling up with and carrying out water cooling of the 85-degree C hot water was 0.5%.

vessel-wall consistency: -- 1.365 - 1.375 g/cm<sup>3</sup> cloudiness whenever (it is 0.35mm in conformity and sample thickness to JIS K7105): -- 4%

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[Translation done.]

